HARBIN ROPV INDUSTRY DEVELOPMENT CENTER

ROPV R40 S Series User Manual

For Use with the Following ROPV Pressure Vessel Models:

R40 150S R40 250S R40 300S R40 400S R40 450S

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General Product Description – R40 S Series
Side Port Membrane Housing

R40 150S Design Pressure:	150PSI / 1.0Mpa / 10Bar (at 120°F / 49°C)
R40 250S Design Pressure:	250PSI / 1.7Mpa / 17Bar (at 120°F / 49°C)
R40 300S Design Pressure:	300PSI / 2.1Mpa / 21Bar (at 120°F / 49°C)
R40 400S Design Pressure:	400PSI / 2.8Mpa / 28Bar (at 120°F / 49°C)
R40 450S Design Pressure:	450PSI / 3.1Mpa / 31Bar (at 120°F / 49°C)
Min. Operating Temp.:	20°F / -6°C
Max. Operating Temp.:	120°F / 49°C
Factory Test Pressure:	ASME: 1.1x Design Pressure Standard: 1.5x Design Pressure
Burst Pressure:	6X Design Pressure
Operating pH Range:	3 – 11
Cleaning pH Range:	2 – 12 (less than 30 minutes)

General Warning – High Pressure Membrane Housing

ROPV vessels are designed to provide safe operation over a long service life if properly installed, operated, and maintained. The vessel may cause loss of life, severe bodily harm, or property damage if not correctly installed, operated, or maintained. Read and understand all guidelines provided in the vessel User Guide. Observe every precaution contained therein. Failure to do so may result in malfunction and potential catastrophic failure. Qualified technicians experienced in servicing hydraulic systems should be used to work with this vessel. Misuse, incorrect assembly, or use of damaged/corroded components may result in catastrophic failure.

Vessel Use and Precautions

- Positive pressure up to the design pressure (PSI) of the specific model being used.
- The required vessel/element interface hardware is supplied with the vessel. Ensure that an element adapter is installed at each end of the vessel before use.
- Vessel expands under pressure and careful consideration must be taken when installing straps/saddles and system connection piping.
- Installation with the straps/saddles provided is strongly recommended.
- Vessel should not support any other system components. Connections should be non-load bearing.
- Periodic inspection of the vessel end closure is recommended to ensure all parts are dry and free of corrosion.
- Failure to understand and follow all precautions may void warranty and result in catastrophic failure of the vessel.
- These guidelines are subject to change. Please check with ROPV to ensure that the User Manual is the latest version for the vessel model being used.
- Mount vessel using strap/saddle hardware provided and span recommended in the engineering drawing.

- Do not over tighten the straps – vessel must be allowed to expand under operation.
- Maximize the connection flexibility to allow for vessel growth under pressure.
- Align the end ports with the system manifold, correcting any misalignment before final installation.
- Provide overpressure protection in the system safety devices.
- Inspect end closures regularly for signs of corrosion. Immediate corrective action and/or replacement is suggested in case of corrosion.
- Relieve system pressure before working on the vessel.
- Do not attempt to over-tighten the Permeate Port connections as this may damage the end closure. One turn past hand tight should be sufficient.
- Never operate the vessel in excess of its ratings. This may void the warranty and cause bodily or property damage.
- Do not operate the vessel permeate port over 125PSI.
- Flush the vessel with permeate before system shutdown to reduce the chance of corrosion.
- Do not install the vessel in direct sunlight.
- Operate the vessel within the recommended pH range - Operating pH Range: 3 – 11, Cleaning pH Range: 2 – 12 (less than 30 minutes).

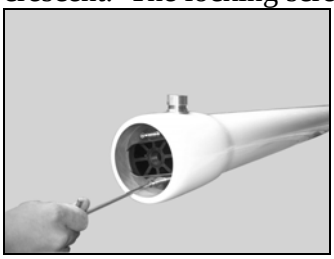
End Plug Removal

Step 1 Shut Down System and Relieve System Pressure – The system must be shut down and all pressure relieved before conducting any maintenance or repair on the vessel.

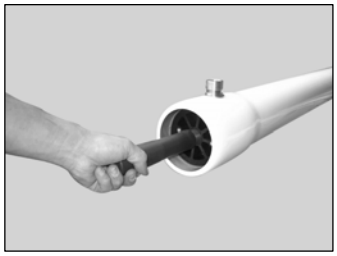
Step 2 Disconnect Permeate Piping – The system piping must be carefully removed from the vessel connections.

Step 3 Inspect End Closure – The end closure should be inspected for any signs of corrosion or damage. Surface corrosion can be removed with a wire brush, while flushing with water. Damaged components should be replaced with approved components from ROPV.

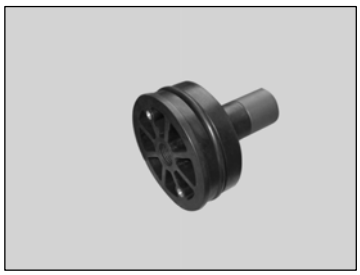
Step 4 Disconnect Locking Screws – Each of the two locking crescents is held in place with a single locking screw. The locking screws can be unthreaded using a hex wrench. The locking screws should be unthreaded from the end plug only, not from the locking crescent. The locking screw and locking crescent can be removed together.

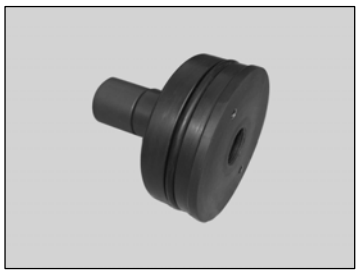


Step 5 Remove the End Plug – A male nipple is recommended for use when opening the end plug. Thread the pipe nipple into the feed/concentrate port of the end plug, gently motion the nipple in various directions, and then gently pull the nipple from the vessel. A firm tug may be required to release the end plug o-ring seal.



Complete End Plug





End plug for 400/450PSI

End Plug Inspection

Step 1 Remove adapter- Grasp the adapter and slowly pull from the end plug. A slight rotating motion may ease the removal of the adapter. There is one o-ring on the inside diameter of the permeate port .

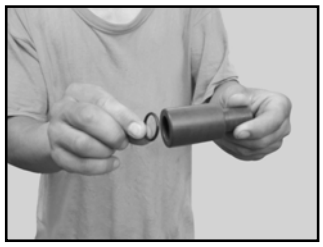
Step 2Inspect O-rings - Remove the end plug o-ring， permeate o-ring and adapter o-ring using a dull, non-metallic tool. All o-rings should be carefully inspected for signs of damage. It is recommended that all o-rings be replaced during each complete servicing of the vessel. Failure to do so may cause poor system performance.

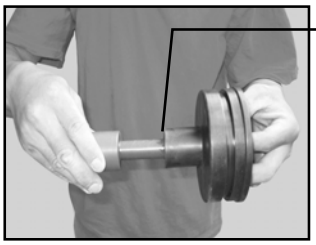
Step 3 Inspect End Plug - All end plug components should be free from scratches, foreign matter, or any sign of damage. Scratched or damaged components should be replaced with ROPV supplied replacement components. All components should be cleaned with a mild soap solution or clean water. The components should be air dried or dried with a lint-free towel.

End Plug Installation

Step 1 General Inspection - Inspect inside of vessel, checking for surface imperfections or any outside material. Surface imperfections can be removed by lightly sanding the area with 600-grit sandpaper. Rinse the vessel completely after any repairs.

Step 2 Install Permeate Port and Adapter O-rings – All o-rings should be coated with a thin layer of glycerine before installation. Seat one permeate port o-ring into each of the two grooves located at the element end, outside diameter of the adapter.





Step 3 Install Adapter-The adapter should be pushed into the permeate port until the wider diameter middle section is flush against the end of the permeate port. Simultaneously pushing and turning the adapter will ease installation.

Step 4 Install End Plug O-ring -Install the end plug seal in the grooved area on the outside diameter of the end plug - the groove should be clear of any sharp edges and foreign matter. Take care to ensure that the seals are properly seated in the groove and are not pinched. Do not use sharp implements when installing the seals.

Step 3 Install the End Plug - Carefully align the end plug at the end of the vessel, ensuring that the end plug is parallel with the sidewall of the vessel. Slowly insert the end plug until the retaining groove is visible.

Step 4 Install Locking Crescents - Inspect and dry the retaining groove. Place one of the locking crescents into the retaining groove, while aligning the screw that is pre-threaded into the crescent over the threaded hole in the end plug. Ensure that the edge of the crescent is seated in the retaining groove before you begin threading the screw into the threaded opening. Once hand tight, the screw can be threaded using a #5 Hex key. Do not over tighten the screws.

Step 5 Reconnect System Piping

Step 6 Pressurize System – A thorough pre-pressurization inspection should be conducted, including verifying that the heads are properly installed, system piping connections are in place, and elements are installed.

Step 7 Inspect for Leaks – All connections should be free from leaks. Do not operate leaking vessels

R40 S Series Parts List

Part Name	R40 150S	R40 250S	R40 300S	R40 400S	R40 450S
Shell	4012.13-18	4012.7-12	4012.1-6	4015.1-6	4015.7-12
End plug	4101(Connect with Adapter 4021) / 4101.1(Connect with Adapter 4021.1)				
Adapter	4021(Connect with End plug 4101) / 4021.1(Connect with End plug 4101.1)				
Feed/Conc.Port	4004				
Retaining Ring	4005				
Strap	4008				
Strap Screw	4009				
Locking Crescent Screw	4012				
Saddle	4010				
Locking Crescent	4011			4011.1	
Plug	4013.1				
End plug O-ring	4002				
Permeate Port O-ring	4061(Connect with End plug 4101) / 4061.1(Connect with End plug 4101.1)				
Adapter O-ring	4007(Connect with End plug 4101 / 4007.1(Connect with End plug 4101.1)				
Feed/Conc.Port O-ring	4006				

Note: Please see the adapter list to get full series adapter

ROPV Limited Warranty

Harbin ROPV Industry Development Center (hereinafter called "ROPV") vessels (the "Product") are warranted to the original purchaser (the "Customer") under normal use and if installed, operated and maintained in accordance with applicable User Guides to be free of defects in material and/or workmanship for a period of one (1) year from date of manufacture subject to the following. Any replacement Product or Part will be warranted only for the remainder of the original warranty period or thirty (30) days, whichever is longer.

Exclusions from this Limited Warranty

The warranty shall be void if:

1. defects are not reported during the warranty period.
2. the Product is subject to accident, damage, incorrect installation, mishandling, abuse, misuse, negligence or accident by any other party.
3. problems caused by modification or alteration.
4. chemical exposure or acts of nature.
5. any item manufactured by other companies.
6. wear on replaceable components under normal conditions – seals are excluded from this warranty.

Procedure for Obtaining Warranty Performance

ROPV reserves the right to determine if a reported defect is a breach of this warranty. This may require, at ROPV's discretion, one or more of the following: 1. an inspection or test of the Product and/or the system in which it was installed by an ROPV representative - the customer is responsible for arranging access to the Product. 2. an inspection or test of the product and/or the system in which it was installed by the Customer. 3. an inspection or test of the product and/or the system in which it was installed by third party inspector appointed by ROPV. 4. return of the Product to ROPV's factory for inspection or testing. This is not a statement of limitations for warranty performance and ROPV reserves the right to conduct warranty performance outside of the items shown.

If the Product is found by ROPV to be defective under the terms of this warranty, ROPV will perform one of the following at its option: 1. supply a substantially similar replacement part based on FOB factory terms. 2. conduct a field repair of the Product. 3. issue a credit for the original cost of the Products. This is not a statement of limitations for warranty performance and ROPV reserves the right to conduct warranty performance outside of the items shown.

Products returned to ROPV for inspection or testing must be shipped freight prepaid at the Customer's expense. If a breach of warranty is confirmed, ROPV will bear all costs related to the inspection and testing. If the Product failure is found to be caused by cause other than breach of warranty, all costs related to the inspection and testing of the Product will be borne by the Customer. This includes a USD$500 per day fee and all related travel expenses.

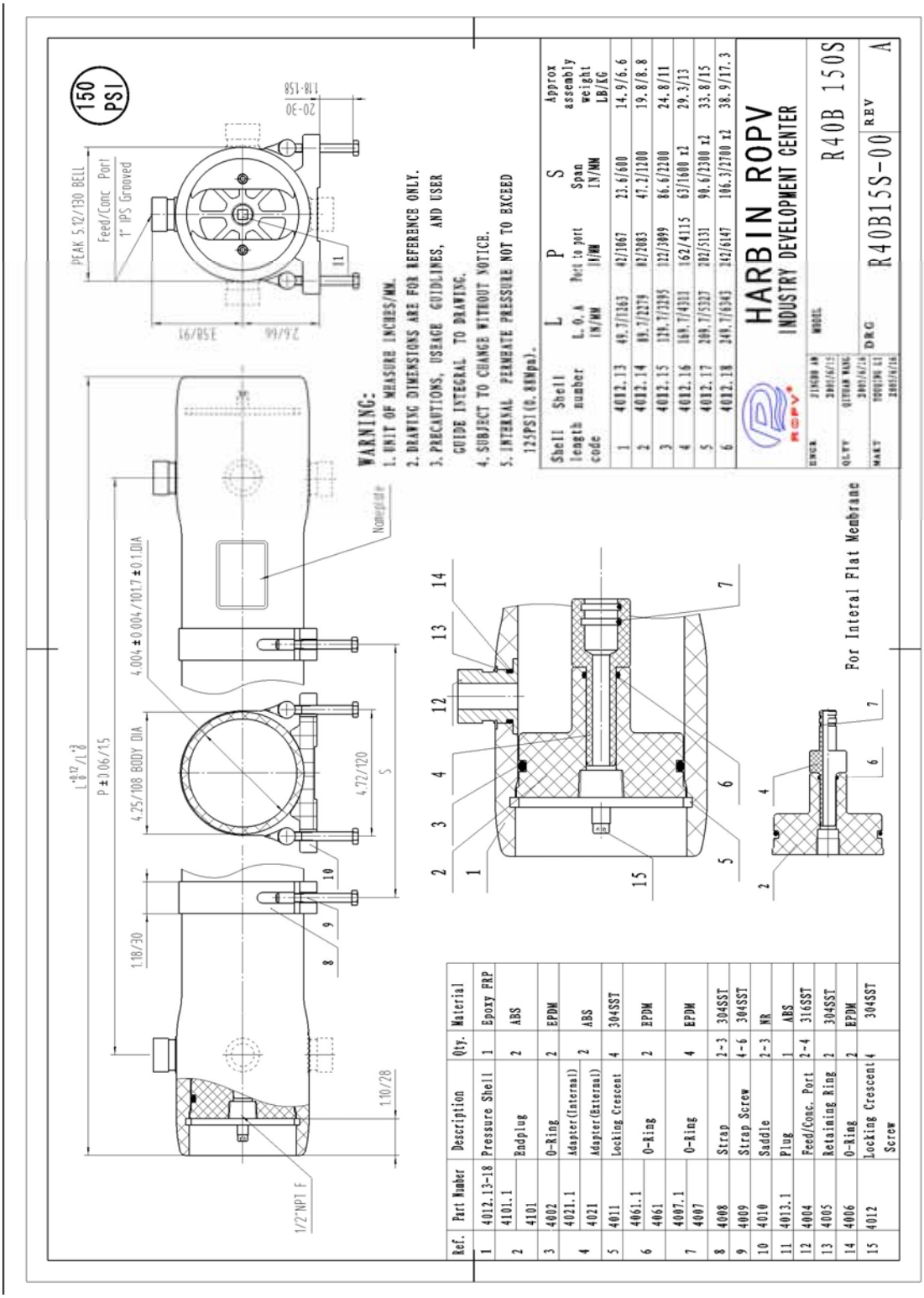
All reported defects must be submitted to ROPV in writing.

Disclaimer

ROPV makes no expressed or implied warranty other than that specifically set forth in this warranty statement. ROPV disclaims any warranty of merchantability or of fitness for a particular purpose. ROPV's liability under the terms of this warranty shall not exceed the purchase price of the Product which are claimed to be defective. ROPV shall not be liable for any consequential or incidental damages whatsoever, including but not limited to injuries or damages to person or property, loss of business profits, business interruption, loss of use, cost of removing/installing Products, or the claims of third parties.

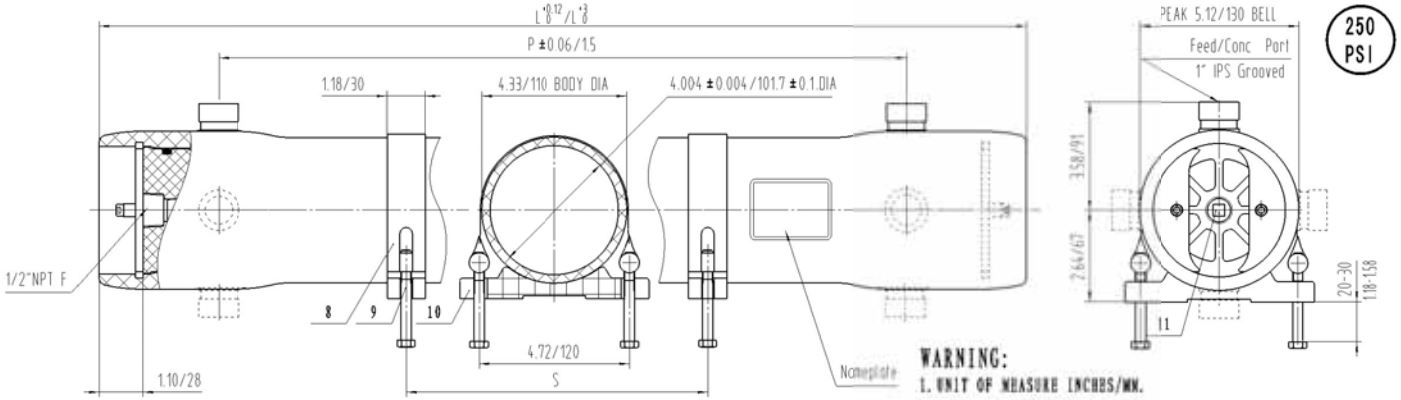
Warranties or Representations by Others

No agent, employee, dealer, or other person has any authority to make any warranties or representations concerning ROPV or the Product. ROPV is not responsible for such claims of warranty or representation.

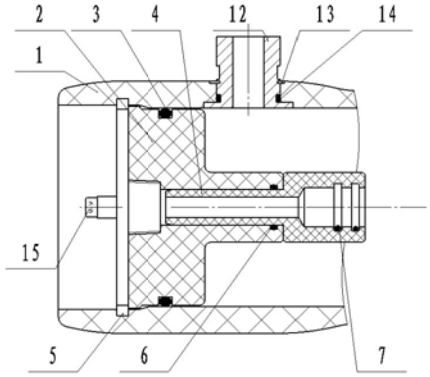


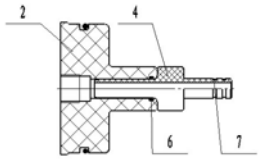
Ref.	Part Number	Description	Qty.	Material
1	4012.13-18	Pressure Shell	1	Epoxy FRP
2	4101.1	Endplug	2	ABS
	4101			
3	4002	O-Ring	2	EPDM
4	4021.1	Adapter(Internal)	2	ABS
	4021	Adapter(External)		
5	4011	Locking Crescent	4	304SST
6	4061.1	O-Ring	2	EPDM
	4061			
7	4007.1	O-Ring	4	EPDM
	4007			
8	4008	Strap	2~3	304SST
9	4009	Strap Screw	4~6	304SST
10	4010	Saddle	2~3	NR
11	4013.1	Plug	1	ABS
12	4004	Feed/Conc. Port	2~4	316SST
13	4005	Retaining Ring	2	304SST
14	4006	O-Ring	2	EPDM
15	4012	Locking Crescent Screw	4	304SST

Shell length code	Shell number	L O.A IN/MM	P Port to port IN/MM	S Span IN/MM	Approx assembly weight LB/KG
1	4012.13	49.7/1263	43/1067	23.6/600	14.9/6.6
2	4012.14	83.7/2379	82/2083	47.2/1200	19.8/8.8
3	4012.15	119.7/3395	122/3099	86.6/2200	24.8/11
4	4012.16	169.7/4311	162/4115	63/1600 x2	29.3/13
5	4012.17	200.7/5327	202/5131	90.6/2300 x2	33.8/15
6	4012.18	249.7/6343	242/6147	106.3/2700 x2	38.9/17.3



Ref.	Part Number	Description	Qty.	Material
1	4012.7-12	Pressure Shell	1	Epoxy FRP
2	4101.1 4101	Endplug	2	ABS
3	4002	O-Ring	2	EPDM
4	4021.1 4021	Adapter(Internal) Adapter(External)	2	ABS
5	4011	Locking Crescent	4	304SST
6	4061.1 4061	O-Ring	2	EPDM
7	4007.1 4007	O-Ring	4	EPDM
8	4008	Strap	1-3	304SST
9	4009	Strap Screw	4-6	304SST
10	4010	Saddle	1-3	NR
11	4013.1	Plug	1	ABS
12	4004	Feed/Conc. Port	1-4	316SST
13	4005	Retaining Ring	1	304SST
14	4006	O-Ring	2	EPDM
15	4012	Locking Crescent Screw	4	304SST





For Interal Flat Membrane

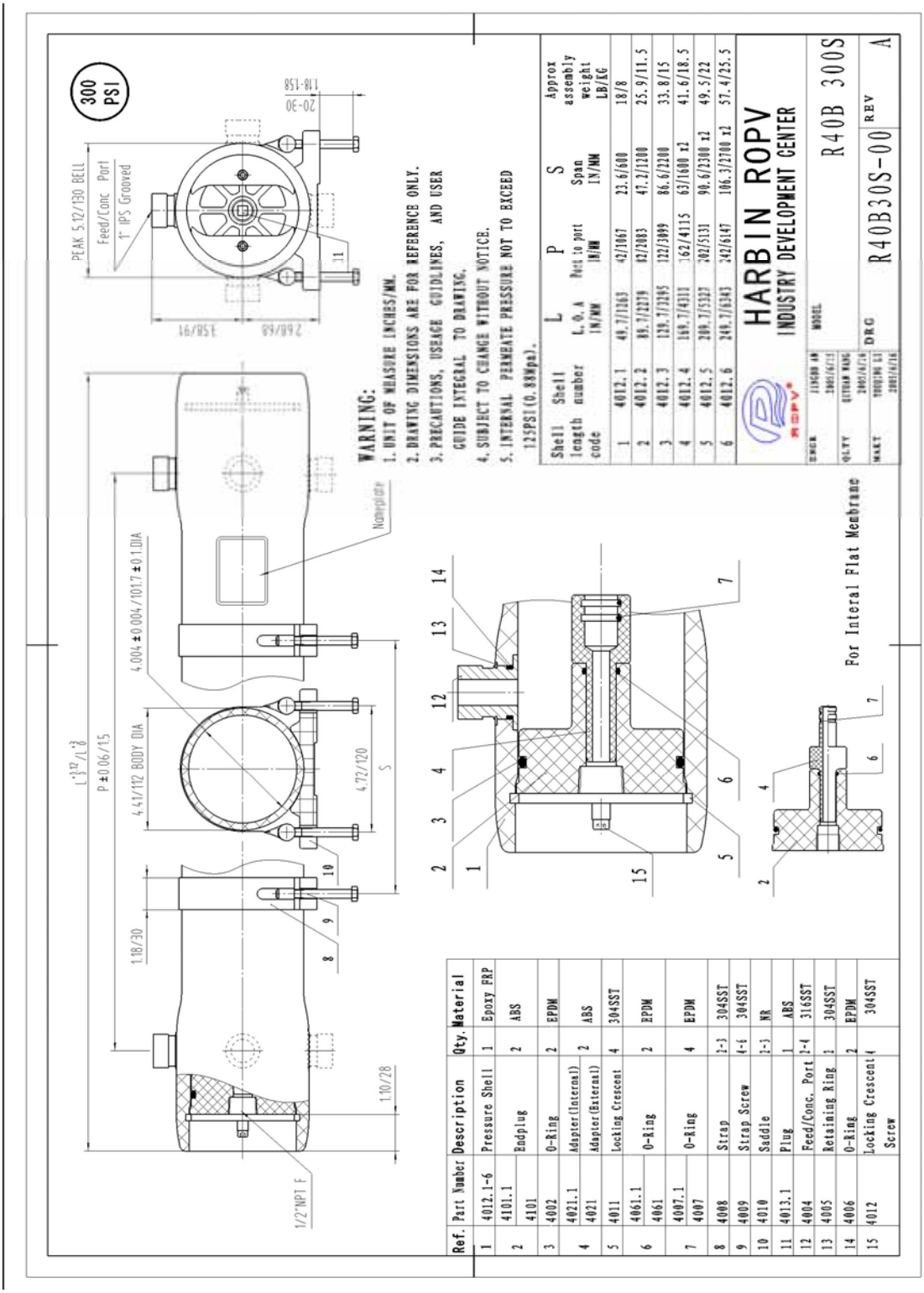
WARNING:

1. UNIT OF MEASURE INCHES/MM.
2. DRAWING DIMENSIONS ARE FOR REFERENCE ONLY.
3. PRECAUTIONS, USEAGE GUIDLINES, AND USER GUIDE INTEGRAL TO DRAWING.
4. SUBJECT TO CHANGE WITHOUT NOTICE.
5. INTERNAL PERMEATE PRESSURE NOT TO EXCEED 125PSI(0.88Mpa).

Shell length code	Shell number	L L.O.A IN/MM	P Port to port IN/MM	S Span IN/MM	Approx assembly weight LB/KG
1	4012.7	49.7/1263	42/1067	23.6/600	16.4/7.3
2	4012.8	89.7/2279	82/2083	47.2/1200	22.5/10
3	4012.9	129.7/3295	122/3099	86.6/2200	29.3/13
4	4012.10	169.7/4311	162/4115	63/1600 x2	35.6/15.8
5	4012.11	209.7/5327	202/5131	90.6/2300 x2	41.6/18.5
6	4012.12	249.7/6343	242/6147	106.3/2700 x2	48.4/21.5

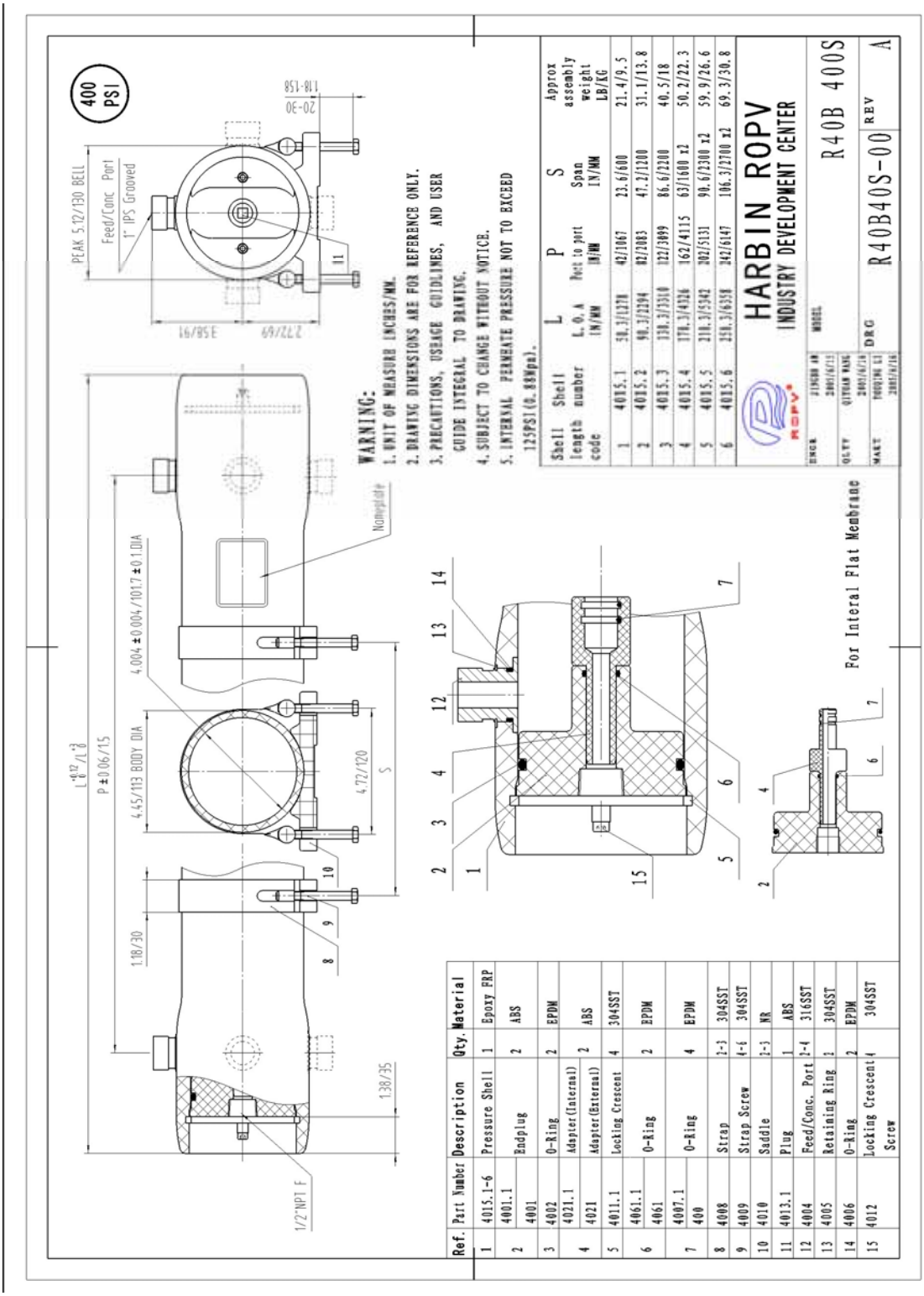
HARBIN ROPV
INDUSTRY DEVELOPMENT CENTER

ENGR	JINGBO AN 2005/6/15	MODEL	R40B 250S
QLTY	QITIAN WANG 2005/6/16		
MART	TUOQING LI 2005/6/16	DRG	R40B25S-00 REV A



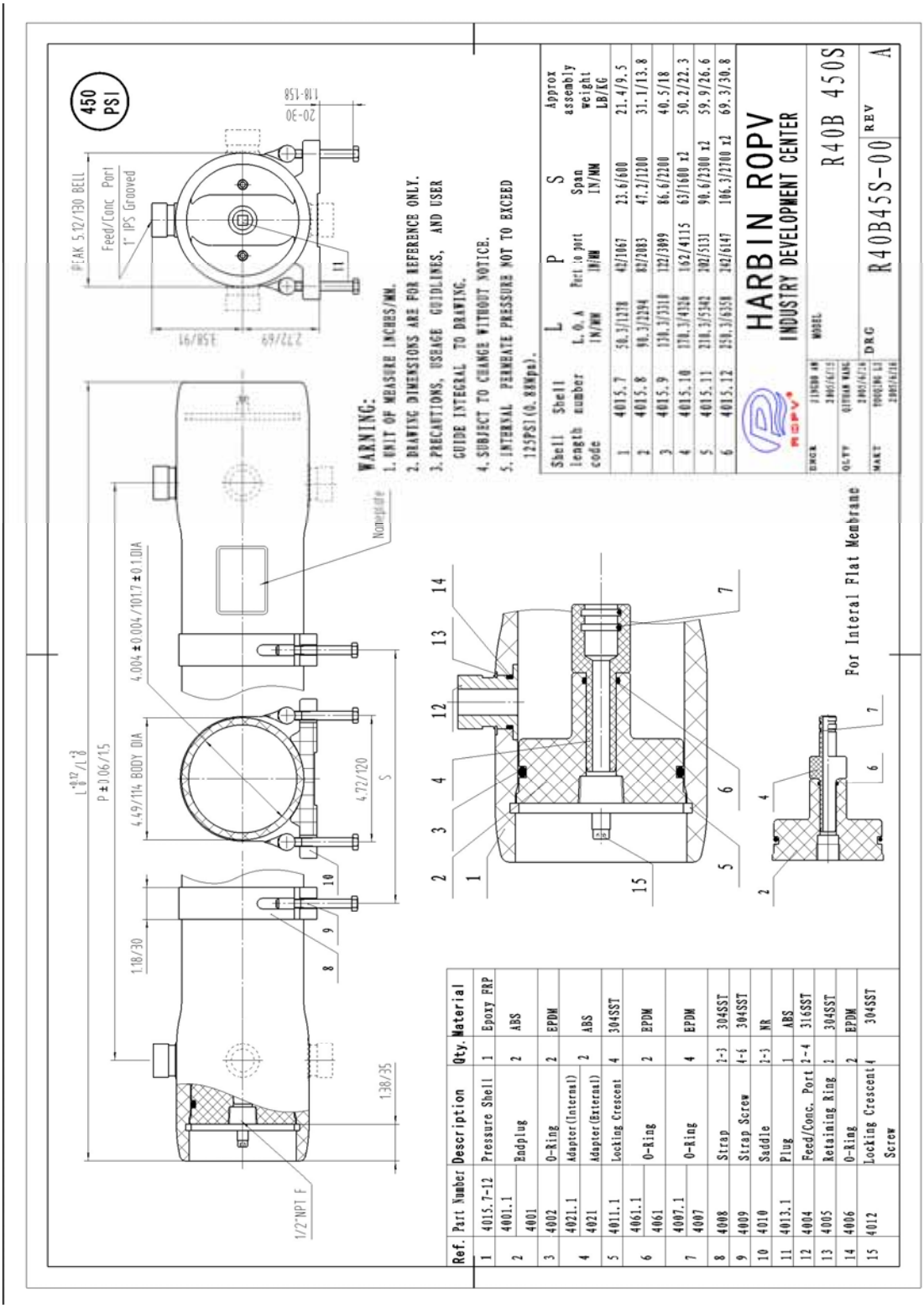
Ref.	Part Number	Description	Qty.	Material
1	4012.1-6	Pressure Shell	1	Epoxy FRP
2	4101.1	Endplug	2	ABS
	4101			
3	4002	O-Ring	2	EPDM
4	4021.1	Adapter(Internal)	2	ABS
	4021	Adapter(External)		
5	4011	Locking Crescent	4	304SST
6	4061.1	O-Ring	2	EPDM
	4061			
7	4007.1	O-Ring	4	EPDM
	4007			
8	4008	Strap	2-3	304SST
9	4009	Strap Screw	4-6	304SST
10	4010	Saddle	2-3	NR
11	4013.1	Plug	1	ABS
12	4004	Feed/Conc. Port	2-4	316SST
13	4005	Retaining Ring	1	304SST
14	4006	O-Ring	2	EPDM
15	4012	Locking Crescent Screw	4	304SST

Shell length code	Shell number	L O.A IN/MM	P Port to port IN/MM	S Span IN/MM	Approx assembly weight LB/KG
1	4012.1	40.7/1163	42/1067	23.6/600	18/8
2	4012.2	80.7/2279	82/2083	47.2/1200	25.9/11.5
3	4012.3	120.7/3285	122/3099	86.6/2200	33.8/15
4	4012.4	160.7/4311	162/4115	63/1600 x2	41.6/18.5
5	4012.5	200.7/5327	202/5131	90.6/2300 x2	49.5/22
6	4012.6	240.7/6343	242/6147	106.3/2700 x2	57.4/25.5



Ref.	Part Number	Description	Qty.	Material
1	4015.1-6	Pressure Shell	1	Epoxy FRP
2	4001.1	Endplug	2	ABS
	4001			
3	4002	O-Ring	2	EPDM
4	4021.1	Adapter(Internal)	2	ABS
	4021	Adapter(External)		
5	4011.1	Locking Crescent	4	304SST
6	4061.1	O-Ring	2	EPDM
	4061			
7	4007.1	O-Ring	4	EPDM
	400			
8	4008	Strap	1-3	304SST
9	4009	Strap Screw	4-6	304SST
10	4010	Saddle	1-3	NR
11	4013.1	Plug	1	ABS
12	4004	Feed/Conc. Port	1-4	316SST
13	4005	Retaining Ring	1	304SST
14	4006	O-Ring	2	EPDM
15	4012	Locking Crescent Screw	4	304SST

Shell length code	Shell number	L O.A IN/MM	P Port to port IN/MM	S Span IN/MM	Approx assembly weight LB/KG
1	4015.1	138.3/1378	42/1067	23.6/600	21.4/9.5
2	4015.2	90.3/2294	82/2083	47.2/1200	31.1/13.8
3	4015.3	138.3/3510	122/3099	86.6/2200	40.5/18
4	4015.4	174.3/4426	162/4115	63/1600 x2	50.2/22.3
5	4015.5	211.3/5342	202/5131	90.6/2300 x2	59.9/26.6
6	4015.6	258.3/6558	242/6147	106.3/2700 x2	69.3/30.8


450 PSI
WARNING:
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HARBIN ROPV
INDUSTRY DEVELOPMENT CENTER
R40B 450S
R40B45S-00
For Interal Flat Membrane

Ref.	Part Number	Description	Qty.	Material
1	4015.7-12	Pressure Shell	1	Epoxy FRP
2	4001.1	Endplug	2	ABS
	4001			
3	4002	O-Ring	2	EPDM
4	4021.1	Adapter(Internal)	2	ABS
	4021	Adapter(External)		
5	4011.1	Locking Crescent	4	304SST
6	4061.1	O-Ring	2	EPDM
	4061			
7	4007.1	O-Ring	4	EPDM
	4007			
8	4008	Strap	2-3	304SST
9	4009	Strap Screw	4-6	304SST
10	4010	Saddle	2-3	NR
11	4013.1	Plug	1	ABS
12	4004	Feed/Conc. Port	2-4	316SST
13	4005	Retaining Ring	1	304SST
14	4006	O-Ring	2	EPDM
15	4012	Locking Crescent	4	304SST
		Screw		

Shell length code	Shell number	L O.A IN/MM	P Port to port IN/MM	S Span IN/MM	Approx assembly weight LB/KG
1	4015.7	50.3/1278	42/1067	23.6/600	21.4/9.5
2	4015.8	90.3/2294	82/2083	47.2/1200	31.1/13.8
3	4015.9	130.3/3310	122/3099	86.6/2200	40.5/18
4	4015.10	170.3/4326	162/4115	63/1600 x2	50.2/22.3
5	4015.11	210.3/5342	202/5131	90.6/2300 x2	59.9/26.6
6	4015.12	250.3/6358	242/6147	106.3/2700 x2	69.3/30.8